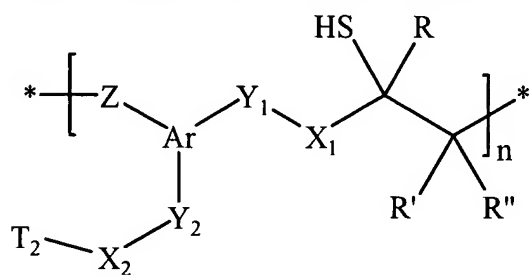


CLAIMS

What is claimed is:

1. An organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(a) a polymeric charge transport composition having the formula



where Y₁ and Y₂ are, each independently, a bond, a -CR₁=N-NR₂- group, or a -CR₃=N-N=CR₄- group;

R, R', R'', R₁, R₂, R₃, and R₄ comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

X₁ and X₂ are, each independently, a linking group;

T₂ comprises a thiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

Ar comprises an aromatic group;

Z is a bridging group; and

n is a distribution of integers between 1 and 100,000 with an average value of at least 2; and

(b) a charge generating compound.

2. An organophotoreceptor according to claim 1 wherein X₁ and X₂ comprise, each independently, a bond or a -(CH₂)_m- group, where m is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino

group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group.

3. An organophotoreceptor according to claim 1 wherein Z comprises a $-(CH_2)_k$ -
 5 group, where k is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_g group, a CR_h group, a CR_iR_j group, or a SiR_kR_l where R_g , R_h , R_i , R_j , R_k , and R_l are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group,
 10 an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group

4. An organophotoreceptor according to claim 1 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a
 15 bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

5. An organophotoreceptor according to claim 1 wherein X_2 and Y_2 are, each independently, a bond and T_2 is H.

6. An organophotoreceptor according to claim 5 wherein Ar comprises an carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, or a thianthrene group; X_1 comprises a methylene group; Y_1 is a $-CR_1=N-NR_2$ -
 25 group where R_1 and R_2 comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group; and Z is O, S, an NR_5 group, or a CO_2 group where R_5 is H, an alkyl group, an alkenyl group, or an aromatic group.

7. An organophotoreceptor according to claim 5 wherein Ar comprises a carbazole group, a julolidine group, or an (N,N-disubstituted)arylamine group; Y_1 is a $-CR_3=N-$

N=CR₄- group where R₃ and R₄ comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group; X₁ is a -(CH₂)₃- group, where two of the methylene groups are replaced by O, and an aromatic group respectively; and Z is O, S, an NR₅ group, or a CO₂ group where R₅ is H, an alkyl group, an alkenyl group, or an aromatic group.

8. An organophotoreceptor according to claim 1 wherein X₂ and Y₁ are, each independently, a bond; Y₂ is a -CR₁=N-NR₂- group where R₁ and R₂ comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group; T₂ is an aromatic group; X₁ is a -O-CH₂- group; Ar is an (N,N-disubstituted)arylamine group, a carbazole group, or a julolidine group; and Z is O, S, an NR₅ group, or a CO₂ group where R₅ is H, an alkyl group, an alkenyl group, or an aromatic group.

9. An organophotoreceptor according to claim 1 wherein X₂, Y₁ and Y₂ are, each independently, a bond; T₂ is H; Ar comprises a bis[(N,N-disubstituted)amino]aromatic group; X₁ is a -O-CH₂- group; and Z is O, S, an NR₅ group, or a CO₂ group where R₅ is H, an alkyl group, an alkenyl group, or an aromatic group.

10. An organophotoreceptor according to claim 1 wherein Y₁ and Y₂ are, each independently, a bond; T₂ is a thiiranyl group; X₁ and X₂ are, each independently, a -CH₂- group; Ar comprises a bicarbazole group; and Z is O, S, an NR₅ group, or a CO₂ group where R₅ is H, an alkyl group, an alkenyl group, or an aromatic group.

11. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a second charge transport material.

12. An organophotoreceptor according to claim 11 wherein the second charge transport material comprises an electron transport compound.

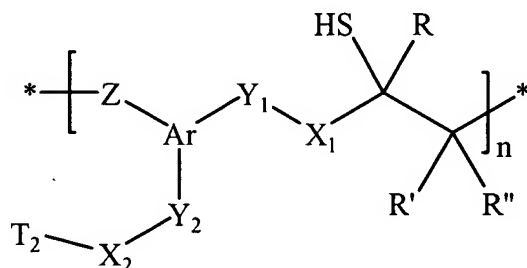
13. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a polymer binder.

14. An electrophotographic imaging apparatus comprising:

(a) a light imaging component; and

(b) an organophotoreceptor oriented to receive light from the light imaging component, the organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(i) a polymeric charge transport composition having the formula



where Y_1 and Y_2 are, each independently, a bond, a $-\text{CR}_1=\text{N}-\text{NR}_2-$ group, or a $-\text{CR}_3=\text{N}-\text{N}=\text{CR}_4-$ group;

R , R' , R'' , R_1 , R_2 , R_3 , and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

X_1 and X_2 are, each independently, a linking group;

T_2 comprises a thiiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

Ar comprises an aromatic group;

Z is a bridging group; and

n is a distribution of integers between 1 and 100,000 with an average value at least 2; and

(ii) a charge generating compound.

15. An electrophotographic imaging apparatus according to claim 14 wherein X_1 and X_2 comprise, each independently, a bond or a $-(\text{CH}_2)_m-$ group, where m is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally

replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group.

16. An electrophotographic imaging apparatus according to claim 14 wherein Z comprises a -(CH₂)_k- group, where k is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_g group, a CR_h group, a CR_iR_j group, or a SiR_kR_l where R_g, R_h, R_i, R_j, R_k, and R_l are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group

17. An electrophotographic imaging apparatus according to claim 14 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

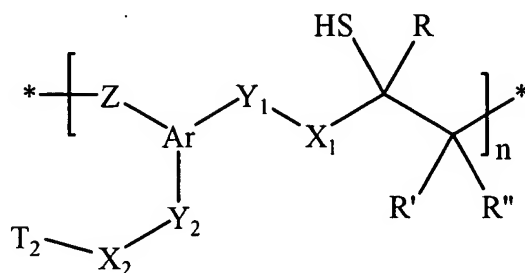
18. An electrophotographic imaging apparatus according to claim 14 wherein the photoconductive element further comprises a second charge transport material.

19. An electrophotographic imaging apparatus according to claim 12 further comprising a toner dispenser.

20. An electrophotographic imaging process comprising:

(a) applying an electrical charge to a surface of an organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(i) a polymeric charge transport composition having the formula



where Y_1 and Y_2 are, each independently, a bond, a $-\text{CR}_1=\text{N}-\text{NR}_2-$ group, or a $-\text{CR}_3=\text{N}-\text{N}=\text{CR}_4-$ group;

5 R , R' , R'' , R_1 , R_2 , R_3 , and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

X_1 and X_2 are, each independently, a linking group;

T_2 comprises a thiiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

10 Ar comprises an aromatic group;

Z is a bridging group; and

n is a distribution of integers between 1 and 100,000 with an average value at least 2; and

(ii) a charge generating compound;

15 (b) imagewise exposing the surface of the organophotoreceptor to radiation to dissipate charge in selected areas and thereby form a pattern of charged and uncharged areas on the surface;

(c) contacting the surface with a toner to create a toned image; and

(d) transferring the toned image to a substrate.

20

21. An electrophotographic imaging process according to claim 20 wherein X_1 and X_2 comprise, each independently, a bond or a $-(\text{CH}_2)_m-$ group, where m is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a , R_b , R_c , R_d , R_e , and R_f are, each
25 independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino

group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group.

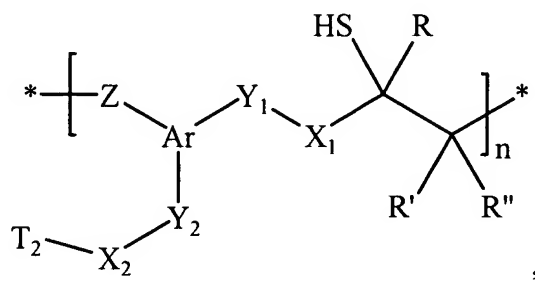
22. An electrophotographic imaging process according to claim 20 wherein Z
5 comprises a $-(CH_2)_k-$ group, where k is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_g group, a CR_h group, a CR_iR_j group, or a SiR_kR_l where R_g , R_h , R_i , R_j , R_k , and R_l are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an
10 alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group

23. An electrophotographic imaging process according to claim 20 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a
15 bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

24. An electrophotographic imaging process according to claim 20 wherein the
20 photoconductive element further comprises a second charge transport material.

25. An electrophotographic imaging process according to claim 20 wherein the photoconductive element further comprises a polymer binder.

25 26. A polymeric charge transport composition having the formula:



where Y_1 and Y_2 are, each independently, a bond, a $-\text{CR}_1=\text{N}-\text{NR}_2-$ group, or a $-\text{CR}_3=\text{N}-\text{N}=\text{CR}_4-$ group;

R , R' , R'' , R_1 , R_2 , R_3 , and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

5 X_1 and X_2 are, each independently, a linking group;

T_2 comprises a thiiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

Ar comprises an aromatic group;

Z is a bridging group; and

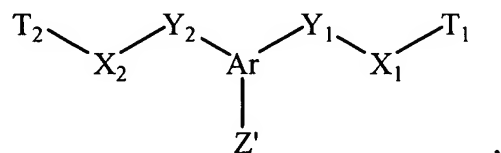
10 n is a distribution of integers between 1 and 100,000 with an average value at least 2.

27. A polymeric charge transport composition according to claim 26 wherein X_1 and X_2 comprise, each independently, a bond or a $-(\text{CH}_2)_m-$ group, where m is an integer
15 between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a , R_b , R_c , R_d , R_e , and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an
20 aromatic group, or part of a ring group.

28. A polymeric charge transport composition according to claim 26 wherein Z comprises a $-(\text{CH}_2)_k-$ group, where k is an integer between 1 and 30, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O,
25 O=S=O, a heterocyclic group, an aromatic group, an NR_g group, a CR_h group, a CR_iR_j group, or a SiR_kR_l where R_g , R_h , R_i , R_j , R_k , and R_l are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring
30 group

29. A polymeric charge transport composition according to claim 26 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

30. A charge transport material having the formula:



where Y₁ and Y₂ are, each independently, a bond, a -CR₁=N-NR₂- group, or a -CR₃=N-N=CR₄- group where R₁, R₂, R₃, and R₄ comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

X_1 and X_2 are, each independently, a linking group;

T₁ comprises a thiiranyl group;

T₂ comprises a thiiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

Ar comprises an aromatic group; and

Z' comprises a reactive functional group that can covalently bond with the thiiranyl group under appropriate reaction conditions.

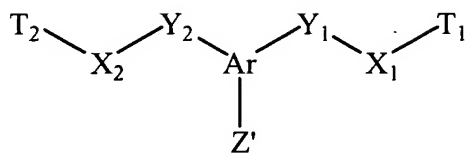
31. A charge transport material according to claim 30 wherein X_1 and X_2 comprise, each independently, a bond or a $-(CH_2)_m-$ group, where m is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a , R_b , R_c , R_d , R_e , and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group.

32. A charge transport material according to claim 30 wherein Z' is selected from the group consisting of a hydroxyl group, a thiol group, an amino group, and a carboxyl group.

5 33. A charge transport material according to claim 30 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

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34. A method for forming a polymeric charge transport composition, the method comprising the step of polymerizing a charge transport material having the formula:



15 where Y₁ and Y₂ are, each independently, a bond, a -CR₁=N-NR₂- group, or a -CR₃=N-N=CR₄- group where R₁, R₂, R₃, and R₄ comprise, each independently, H, an alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

X₁ and X₂ are, each independently, a linking group;

20 T₁ comprises a thiiranyl group;

T₂ comprises a thiiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

Ar comprises an aromatic group; and

25 Z' comprises a reactive functional group that can covalently bond with the thiiranyl group under appropriate reaction conditions.

35. A method for forming a polymeric charge transport composition according to claim 34 wherein X₁ and X₂ comprise, each independently, a bond or a -(CH₂)_m- group, where m is an integer between 0 and 20, inclusive, and one or more of the methylene

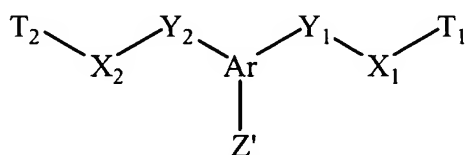
groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group, an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group.

36. A method for forming a polymeric charge transport composition according to claim 34 wherein wherein Z' is selected from the group consisting of a hydroxyl group, a thiol group, an amino group, and a carboxyl group.

37. A method for forming a polymeric charge transport composition according to claim 34 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

38. A method for forming a polymeric charge transport composition according to claim 34 wherein the polymerizing step is initiated by the adjustment of the pH, the temperature, the concentration, or a combination thereof.

39. A method for forming a polymeric charge transport composition, the method comprising the step of co-polymerizing an acid anhydride and a charge transport material having the formula:



where Y₁ and Y₂ are, each independently, a bond, a -CR₁=N-NR₂- group, or a -CR₃=N-N=CR₄- group where R₁, R₂, R₃, and R₄ comprise, each independently, H, an

alkyl group, an alkenyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

X_1 and X_2 are, each independently, a linking group;

T_1 comprises a thiiranyl group;

5 T_2 comprises a thiiranyl group, H, an alkyl group, an alkenyl group, or an aromatic group;

Ar comprises an aromatic group; and

Z' comprises a reactive functional group that can covalently bond with the thiiranyl group under appropriate reaction conditions.

10

40. A method for forming a polymeric charge transport composition according to claim 39 wherein X_1 and X_2 comprise, each independently, a bond or a $-(CH_2)_m-$ group, where m is an integer between 0 and 20, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, a heterocyclic group,
15 an aromatic group, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a , R_b , R_c , R_d , R_e , and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, a heterocyclic group, an aromatic group, or part of a ring group.

20 41. A method for forming a polymeric charge transport composition according to claim 39 wherein wherein Z' is selected from the group consisting of a hydroxyl group, a thiol group, an amino group, and a carboxyl group.

42. A method for forming a polymeric charge transport composition according to
25 claim 39 wherein Ar is selected from the group consisting of a carbazole group, a julolidine group, an (N,N-disubstituted)arylamine group, a bis[(N,N-disubstituted)amino]aromatic group, a bicarbazole group, a phenazine group, a phenothiazine group, a phenoxazine group, a phenoxathiine group, a dibenzo(1,4)dioxine group, and a thianthrene group.

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